H
0622/00-10
1929 c.1

METHODS FOR REDUCING WHEATSTEM SAWFLY DAMAGE

By E. H. STRICKLAND
University of Alberta

During the past few years the Wheatstem Sawfly has become permanently established as a wheat pest over a large area in Alberta. Where losses from this insect have already occurred it is too late to employ methods in an attempt to prevent its establishment. From this time onwards we must concentrate upon methods for reducing the annual damage that it will produce.

Effect of Climate on Sawfly Abundance

Sawflies, generally speaking, increase in numbers in moderately dry seasons. Not only do they do more damage during such seasons, but they will be present in increased numbers to attack wheat during the following year.

Excessive moisture, or extreme drought, in June reduces their numbers; but, once they have shown up in a district, they will always be present in sufficient numbers to cause severe losses when climatic conditions are favourable.

Life-history

The small wasplike sawflies escape from the stubble, where they have overwintered, late in May, and, usually by short flights near the ground, they seek suitable stems of grain or grasses in which to lay their eggs. The majority of eggs are laid in June, though in some years many are still being laid as late as in the middle of July.

The eggs are forced into the stems below the developing head, and the grubs which hatch from them burrow downwards inside the straw till, by harvest-time, they are below ground level. These grubs now turn round, so that their heads are uppermost, and cut off the straw at a point usually about an inch above the ground.

After plugging the open end of the stub the grub spins a silken cocoon and remains, more or less inactively, inside it until the following spring when it will, eventually, escape as a winged sawfly.

Cultural Methods for Destroying Sawflies

Since every sawfly grub that had bred in wheat passes the winter in the stubble it has been maintained that, if the infested stubs be ploughed-in after harvest, very few sawflies will escape in the spring. The object in ploughing should be to turn the stubble well over, so that the open ends will be pointing downward. A mouldboard plough, fitted with a jointer or skim-colter, should therefore be employed whenever possible.

Our own experiments have proved that this fall ploughing does not destroy many of the sawflies. It, however, greatly retards their development in the spring on account of their being buried in cold earth. Many of the sawflies that ultimately struggle to the surface are a month behind those from unploughed stubble in their development. They may lay their eggs so late in the season that their grubs are unable to mature before harvest.

Spring ploughing had practically no effect on the sawflies. Even when followed by a very thorough packing it failed to imprison them or to retard their development to any appreciable degree.

All that we can conclude is that fall ploughing, particularly on the heavier types of soil, will reduce the numbers of sawflies to some extent, but it is by no means a certain method of control, while spring ploughing is rarely of any value at all.

Cultivating Infested Stubble

In those areas in which the snowfall is usually light, fall cultivation may give better results than ploughing. The object is to drag as many infested stubs to the surface as is possible and to leave them exposed throughout the winter. Only in those stubs which are entirely exposed will the contained grubs perish. The cultivator should, therefore, be set to work no more deeply than to the base of the plants in order that no more earth be disturbed than is necessary to drag them out.

In areas that are snow-covered during the winter, this method is of little value.

Stubble-burning

Ordinary stubble-burning is of little value whether it be done in the fall or in the spring. A stubble burner, which directs a flame downwards, or scattering six inches of straw over infested stubble may be of some value in destroying the grubs if the soil is quite dry, but the employment of either method is usually too ineffective to be recommended.

Trap-cropping

The most hopeful method for reducing sawfly damage is that of employing trap-crops in which the sawflies will lay their eggs instead of so doing throughout our wheat-fields.

The most obvious precaution to take, and it is one that should never be disregarded, is *never seed wheat in a field in which sawflies damaged the crop in the previous year.* To do so in a field that has been simply spring ploughed is to increase the damage in so far as is humanly possible. It is hardly less safe after fall cultivation or ploughing.

Grow wheat only after summer-fallow, or after some immune crop such as oats, barley, fall rye or flax that have been *free from volunteer wheat.*

In May and June, when the recently emerged sawflies are seeking suitable stems for egg-laying, they fly near the ground till they reach a growth of grain or grass that is about six inches or more in height. Having found this, they move very little again, but remain in it till they have laid their eggs. If they enter the edge of a well-advanced wheat-field they usually lay nearly all of their eggs within the first two rods from the edge since they have already found suitable egg-laying sites. If, however, the field is backward they scatter throughout it before coming to rest and do so only when the plants are of a sufficient height to attract them for egg-laying. Thus the whole field is liable to be affected, with a concentration on the earliest developing knolls.

In some years the sawflies fly rather earlier than usual. They may then pass right over the more backward fields and infest only those that are more forward. In other years, when they appear rather late in the season, the backward fields are liable to be infested throughout, while those that are more forward are attacked only around the edges. Farmers cannot avoid trouble, with any certainty, as some have believed from their experience gained in a single season, by seeding either earlier or later than their neighbours.

A trap-crop, which consists of a more vigorous growth of a suitable grain or grass than that in the fields to be protected, grown around the edges of the field is the most certain method for reducing infestation.

As a *permanent* trap-crop, BROME GRASS, seeded along the headlands and fence-rows, is probably the most effective crop that can be grown. It is very attractive to the sawflies for egg-laying, and it makes the necessary vigorous growth in the spring.

In connection with all trap-crops it should be remembered that only one sawfly grub can mature in a single stem. The strongest grub present destroys all of its rivals. Fortunately for us, the sawflies do not know whether an egg has already been laid in a stem or not; as a result a great number may be laid in the same stem in trap-crops. The largest number that we have found was twenty-six. Of these twenty-five were bound to perish. In a neighbouring wheat-field they might have been laid in twenty-five separate stems, each of which would eventually have been cut down by the contained grub.

In Brome, the single survivor, even, has a poor chance to mature. Many die a natural death in this grass and many more are killed by other insects, their parasites. The heavily infested brome trap will not, therefore, breed many sawflies, but it probably will produce a large number of parasites. Mr. Seamans, of the Dominion Entomological Laboratory at Lethbridge, has shown that in Central Alberta many of these parasites are now attacking, and killing, sawfly grubs in wheat. He recommends *seeding brome with a nurse crop of oats, which will produce an efficient trap-crop for the first year before the brome has made sufficient growth to be effective.

We would urge upon all individual farmers and upon the Councils of Municipal Districts in the infested area, and also in adjacent areas in which the sawfly has not as yet become established, to encourage the seeding of as much brome grass as is possible along roadsides and fence-rows.

For a *temporary* trap-crop we have obtained the best results with WHEAT. Either late in the fall, or as early in the spring as is possible, seed a single drill-width of wheat around all stubble fields that are known to be infested. We prefer this to seeding the trap along the edge of the field that is, later, to be seeded with wheat. A trap-crop tends to retain the sawflies more definitely for egg-laying if it is a little removed from a growing crop. Any sawflies that may fly through such a trap strip tend to return to it if they do not find themselves to be still among growing grain.

The trap-wheat should be cut during the last two weeks of July. All sawfly grubs that it contains will thus be destroyed.

OATS can be used to replace wheat if desired. We have not found this crop to be as effective as wheat as a trap in certain seasons, since it is inclined to make a shorter stem growth early in the summer. It has, however, the advantage of providing a better green-feed than wheat, if it is cut for this purpose. Since the sawflies cannot mature in oat stems it is not necessary to cut this crop till it is mature, if it is so desired.

Fall Rye is not recommended. It is *too* advanced when the sawflies are laying their eggs to be very attractive to them.

CUTTING INFESTED WHEAT ON THE "GREEN SIDE"

The sawfly grubs sever the straw only when the latter is beginning to dry out at the base. At this time the grain is already ripening and it is possible to harvest a uniformly maturing field just ahead of the appearance of sawfly damage without causing serious shrinkage. In this manner most of the damage can be avoided. Experience, alone, will inform the farmer of the first day on which he can begin to cut. He will, however, probably have only about four or five days during which he can harvest in safety before the grubs start to cut down the infested straws. It will be necessary, therefore, to concentrate at this season upon cutting the worst infested fields.

---

*59th Report of Entomological Society of Ontario, 1928.

How to Ascertain the Percentage of Infestation

At about two weeks before harvest gather at least 500 straws, selected from different parts of the field. Split each one open. Every straw that contains a sawfly grub will be partly filled with a sawdust-like material. If 70% of the straws collected from one field are infested, approximately 70% of the crop will be lying on the ground if it is not harvested till it is ripe. Two per cent, only, of the straws collected in another field may contain this dust. Obviously there is no urgent necessity to cut this field early, but every effort should be made to harvest as much of the first field as is possible before sawfly damage shows up.

Immune Crops

Fall Rye, Oats and Barley do not suffer from sawfly damage. The sawflies do, however, lay their eggs in them, though, here, all of the grubs perish. Any of these can be grown in a field following infested wheat. The two latter, particularly, will serve, also, as a useful trap for the sawflies that escape in the spring, provided they are sown early in the season. When, as is usually the case, they are seeded late, the sawflies leave the field and have infested neighbouring wheat before they have produced a sufficient growth to retain them.

In Manitoba, where Durum wheat is grown extensively in order to avoid rust damage, losses from sawflies have decreased, since this variety is less susceptible to attack than are the hard wheats.

All solid stemmed crops, such as sunflowers, flax or corn are quite immune from attack and a trap-crop should be seeded, early in the season, around infested stubble that is seeded to these crops in order to prevent the migration of egg-laying sawflies into neighbouring fields.

A clean summerfallow is always free from sawflies in the spring. Any infestation that may occur in it is due to migrations to it of egg-laying sawflies that breed elsewhere. A Brome trap-crop will largely prevent any infestation. Where this has not been planted, seed early and try to encourage a vigorous growth in order to confine the damage, in so far as is possible, to the edges of the field.

EDMONTON: Printed by W. D. McLean, King's Printer.